

introducing a fluorocarbon gas into the reaction chamber, wherein the fluorocarbon gas contains at least one of C_4F_6 , C_5F_8 , and C_6F_6 gases; and

creating a plasma from the fluorocarbon gas and etching the silicon dioxide film with the plasma,

wherein a residence time τ of the fluorocarbon gas in the reaction chamber is controlled at a value greater than 0.1 sec and equal to or less than 1 sec, the residence time τ being given by $P \times V/Q$, where P is a pressure (unit: Pa) of the fluorocarbon gas, V is a volume (unit: L) of the reaction chamber and Q is a flow rate (unit: $Pa \cdot L/sec$) of the fluorocarbon gas.

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4. (Amended) A plasma processing method comprising the steps of:
placing a substrate inside a reaction chamber of a plasma processing system, a silicon dioxide film having been formed on the surface of the substrate;

introducing a fluorocarbon gas into the reaction chamber, wherein the fluorocarbon gas contains at least one of C_4F_6 , C_5F_8 , and C_6F_6 gases; and

creating a plasma from the fluorocarbon gas and etching the silicon dioxide film with the plasma,

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wherein PxW_0/Q is controlled at a value greater than $0.8 \times 10^4 \text{ sec} \cdot W/m^3$ and equal to or less than $8 \times 10^4 \text{ sec} \cdot W/m^3$, PxW_0/Q being a product of a residence time τ of the fluorocarbon gas in the reaction chamber and a power density P_i of power applied to create the plasma, the residence time τ being given by PxV/Q , where P is a pressure (unit: Pa) of the fluorocarbon gas, V is a volume (unit: $Pa \cdot L/sec$) of the fluorocarbon gas, the power density P_i being given by W_0/V , where W_0 is a magnitude (unit: W) of the power and V is the volume (unit: L) of the reaction chamber.

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7. (Amended) A plasma processing method comprising the steps of:
placing a substrate inside a reaction chamber of a plasma processing system;
introducing a fluorocarbon gas into the reaction chamber, wherein the fluorocarbon gas contains at least one of C_4F_6 , C_5F_8 , and C_6F_6 gases; and
creating a plasma from the fluorocarbon gas and depositing an organic film on the substrate using the plasma,